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Quebec Region
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STOCK ASSESSMENT OF NORTHERN QUEBEC (NUNAVIK) BELUGA (*Delphinapterus leucas*)

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Figure 1. Map of communities in northern Quebec (Nunavik). The community of Killiniq closed in 1978.

Context

Beluga whales are found in summer along the coasts of Hudson, James and Ungava Bays. The majority of these animals are thought to overwinter in Hudson Strait. At least three separate populations have been identified (Ungava Bay, eastern Hudson Bay and western Hudson Bay). In 2004, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) recommended that the Ungava Bay (UB) and eastern Hudson Bay (EHB) population be classified as endangered.

In addition to the traditional subsistence hunt, commercial hunts in Ungava Bay removed at least 1,340 animals between the 1860's until the early 1900's. The numbers of beluga killed appear to have declined owing to depletion of the population. Commercial hunting at the Little Whale and Great Whale rivers, in eastern Hudson Bay, removed an estimated 7,875 animals between 1854 and 1863. Commercial hunting continued at Great Whale River until at least 1877, but apparently ended owing to depletion of the population. Current subsistence hunting is directed towards both resident populations in summer and migrating whales from a mixture of populations during spring and fall. Previous analyses have indicated that high subsistence harvests have limited recovery of the eastern Hudson Bay and Ungava Bay beluga populations.

The beluga hunt in northern Quebec is regulated by the Department of Fisheries and Oceans via a three-year management plan, which allows for annual adjustment of the Total Allowable Take (TAT) upon availability of new scientific information. Harvesting is regulated through a combination of area closures, controlled season and village quotas. In 2006, the Nunavik Inuit Land Claims Agreement (NILCA) was signed. This agreement calls for the establishment of a wildlife management board that will assume responsibility for the co-management of beluga in northern Quebec beginning with the 2010 harvest year.

March 2010

Canada

The NMRWB requested science advice on total allowable takes for 2010 hunting season. The requested advice was:
a) the maximum harvest level for EHB beluga that would not result in a decline in the stock population, and
b) the harvest level for EHB beluga that would result in an increase in population.

SUMMARY

- The current population size is estimated at about 3,300 animals and is likely stable.
- The impact of harvesting on the EHB beluga whale population is the sum of animals killed in EHB, plus the EHB animals taken during spring/summer and fall in the Sanikiluaq and Hudson Strait hunts.
- At the time this advice was developed only 38 EHB belugas had been removed from the population but the hunting season was not complete. In this case a reported harvest of 55 whales would have a 0.50 probability of causing a decline in the population. If the 2009 TAT is taken in full, then a harvest exceeding 50 animals in 2010 would have a 0.5 probability of causing decline in the EHB population.
- However, harvest levels should be reduced further in 2010 if the population is to be allowed to recover. Reducing harvests to 15 EHB animals would have only a 0.30-0.35 probability of causing the population to decline depending on overall harvests in 2009. Harvests at these levels would more likely result in population growth.

BACKGROUND

Species Biology

Beluga whales have a circumpolar distribution. They are medium-sized toothed whales with an adult length of 350 cm and weigh up to 500–600 kg. Mating is thought to occur in March-April, with calving occurring in mid-summer. Calves are born after a 14 month gestation and lactation lasts roughly 18 months. The calving interval is 3 years. At birth, the calves have been described as being brown or dark bluish in colour. As they mature, the skin becomes lighter in colour gradually turning to grey and then to white. In the EHB population, 57% of the light grey animals may be sexually mature. Sexual maturity might fall between 8 and 14 years of age, and longevity may be 60+ years. Beluga lack a dorsal fin, which is believed to be an adaptation to inhabiting ice covered waters. They are often associated with estuaries, which has led to the view that they are a shallow water species. However, aerial surveys and satellite telemetry indicate substantial movements offshore and diving to depths of over 600 m.

The Hunt

Harvest statistics are available since 1974. These statistics represent minimum estimates only, since not all villages provided catch data in all years, and information on the number of animals struck and lost is incomplete. During the 12 year period 1974–1985, a total of 5,402 whales (average=450 whales/yr) was reported to have been taken. The introduction of quotas in 1986 reduced annual harvests to an average 258 belugas/yr during 1986–2001

(range: 162–385 belugas/yr), and to an average 175 belugas/yr after 2001 (range: 125–216 belugas/yr). Historically the highest reported harvests have been from Hudson Strait (Lesage et al. 2009).

ASSESSMENT

Belugas in the waters adjoining northern Quebec were originally separated into different populations based on the summer distribution of animals. Beluga that summer in Ungava Bay, along the eastern Hudson Bay coast (EHB), and the western Hudson Bay coast have been recognized as separate stocks. Genetic analyses support the principal of an eastern and one or more western Hudson Bay beluga stocks.

The harvest consists of animals taken from different stocks. Approximately 12% of beluga taken by Sanikiluaq (Nunavut) hunters prior to early July is assigned to the EHB stock. In Hudson Strait approximately 10% of the animals harvested prior to 1 September from this area belong to the EHB stock. This proportion increases to about 20% in the fall (after 1 September)

A simple exponential model, incorporating information on catches fitted to aerial survey estimates of abundance, resulted in a 1985 EHB stock population estimate of 4, 200 animals (95% Credibility Interval 2,200-7,700). The model estimated that the population in 2009 was 3,300 in 2009 (95% Credibility Interval 1,600-6,500). At current harvest levels the population has probably been stable in the last few years (Fig. 2). The estimated intrinsic rate of population increase of 3.0% (i.e.: the population production before harvesting) is within the range expected for other cetaceans with similar life histories. Struck and loss was estimated by the model at 63% but this estimate may also include other biases in catch estimation (see below Sources of uncertainty).

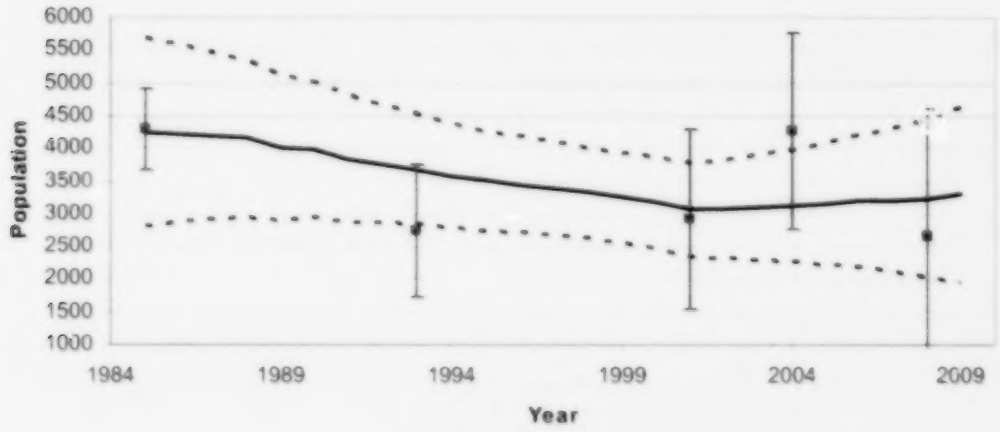

Figure 2. Aerial survey and model estimates (± SE) of eastern Hudson bay beluga abundance fitted to aerial survey estimates corrected for animals at the surface.

Using harvest statistics available in mid-November, it was estimated that hunters had landed 38 EHB animals from the total Nunavik beluga catch up to mid-November 2009. If no further

harvesting had occurred, then a reported removal of 55 EHB animals in 2010 would pose a 0.5 probability of a decline in the population. Reducing this reported catch to 15 EHB animals per year is estimated to have a 0.30 probability of causing a decline in the population (Fig. 3). If however, the full 2009 Nunavik total allowable take is harvested, resulting in a reported removal of approximately 53 EHB animals , then the TAT would have to be reduced to 50 animals in 2010 to maintain a 0.50 probability of causing a decline in the population, while a reported removal of 15 EHB animals reduces the probability of a decline in the population to 0.35.

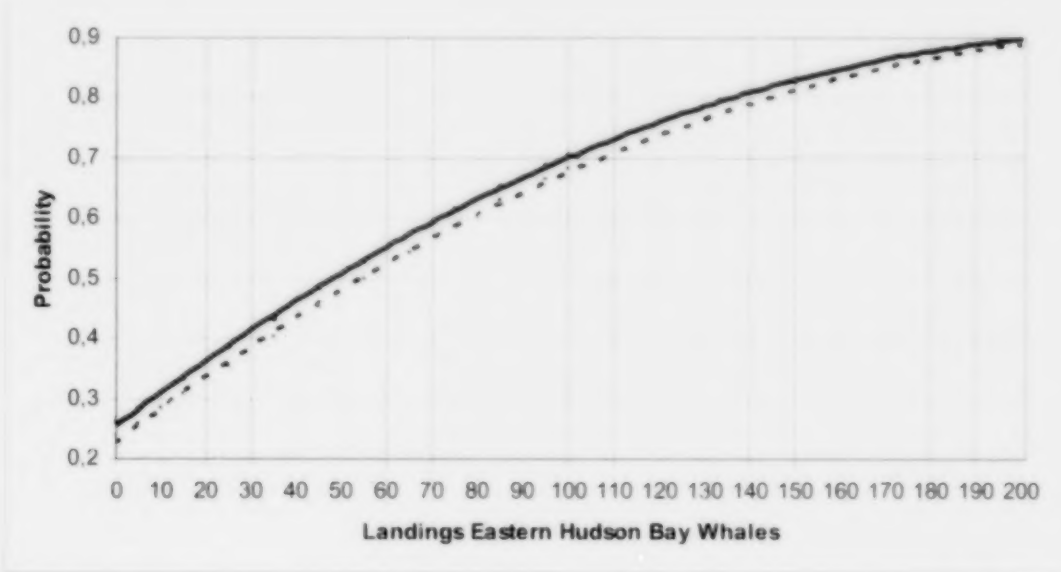

Figure 3: Eastern Hudson Bay belugas . Probability of stock decrease at different catch levels estimated by a Bayesian stock-production model assuming deterministic stock dynamics. The solid line represents the probability of a decline if all of the TAT was taken in 2009 (approximately 53 EHB beluga whales). The dotted line represents the probability of decline if only 38 EHB beluga whales were reported taken, which was the case in mid-November based on the harvest statistics.

Sources of uncertainty

There is uncertainty associated with the aerial survey estimates. This uncertainty results from the very clumped distribution of whales. Other factors include the variability in surfacing behaviour of the whales. Fitting a population model to the data helped to reduce some of the uncertainty around the estimates of current population size, but the coefficients of variation remain quite high (cv=40%). More frequent surveys would reduce some of the uncertainty, as well as increased participation in the sampling program and improvements in field observations of actual struck and loss rates. There is a lack of data on vital rates, which limits opportunities to model the dynamics of this population. Abundance estimates for this population are limited to five aerial surveys, flown in 1985, 1993, 2001, 2004 and 2008. Aerial survey estimates were corrected for animals that were diving when the survey plane passed overhead. Estimates of total population size are very sensitive to the size and variability associated with this correction factor which is based on limited data.

Belugas harvested in the community of Sanikiluaq, Nunavut are of mixed origin. However, it is not possible using aerial survey techniques to determine the proportion of animals in the offshore regions that belong to the EHB population or the western Hudson Bay population. Haplotype composition of samples from animals harvested during spring/early summer indicates that EHB animals represent about 12% of the Sanikiluaq harvest. At current harvest levels, Sanikiluaq probably removes 3–4 EHB beluga from the population annually. Satellite telemetry indicates that from mid-July to late September, a large proportion of the EHB population moves offshore near Sanikiluaq. Although current harvesting is limited to the early summer or winter, and the genetic data support that few EHB animals are taken at those times, seasonal changes in harvesting practices by Sanikiluaq hunters could have an important impact on the EHB beluga population. Communities north of the eastern Hudson Bay arc and in Hudson Strait are hunting beluga from both the small EHB population and the large western Hudson Bay population. Results from the genetic analyses indicate that about 10% of the animals harvested in Hudson Strait prior to 1 September belong to the EHB population, whereas approximately 20% of the animals harvested after 1 September belong to the EHB stock. We are uncertain as to the full extent of the variability in these proportions which would affect the overall number of EHB animals removed.

Harvest statistics have been gathered since the 1970's. These statistics include a column for animals struck but not recovered. Typically this column has a value in the weekly statistic reports of 0 to 1. However, modeling suggests that this figure is probably closer to 60% of the catch. This value represents both animals struck and lost and animals killed but not reported. It also represents errors in the classification of animals to the EHB stock.

The maximum rate of increase is not known for northern Quebec beluga. The model fitted to the survey and catch data estimated a rate of increase of 3% which is within the range of values accepted for beluga. However, for such a small population relative to estimated pristine levels, a rate approaching the maximum would be expected. The continued harvest on females with calves may be having some impact on recovery, but this is highly uncertain.

ADDITIONAL STAKEHOLDER PERSPECTIVES

The Inuit of northern Quebec consider Beluga to be an important food resource. There is a general concern regarding contaminants and disease agents that could affect the health of beluga and their human consumers. Other concerns include climate change and the resultant changes in sea ice, which might affect whale movements, their foods and hunter access to whales. Community consultations raised concerns about the increase in numbers of both small boats and large ships, and how increasing noise might disturb beluga, particularly in nearshore areas.

A wide range of concerns have been expressed about beluga whale abundance. Some people have difficulty understanding and accepting survey estimates, because they have seen large numbers of whales in areas where only small numbers of whales have been seen during the survey period. Several people expressed concern that they were seeing fewer animals than in the past. However, it is not clear whether changes in sightings are a result of a reduction in beluga abundance, or animals having moved elsewhere. Some communities in EHB have also stated that there are fewer whales today than during previous years. However, other communities particularly in Hudson Strait feel very strongly that beluga are abundant.

CONCLUSIONS AND ADVICE

The current population size is around 3,300 animals (95% Credibility Interval: 1600-6500) and is likely stable.

This advice was developed in mid-November before harvesting for the season had been completed. If more animals are harvested then this will lead to recommendations to remove fewer animals in 2010 to have the same impact on the population. The range of animals presented below reflects whether no additional harvesting occurred since mid-November or if the full TAT was taken.

Current information indicates that a harvest exceeding 50- 55 EHB animals would have a probability of 0.5 to 0.55 of causing a decline in the population. However, reducing harvests to 15 EHB animals would reduce the probability of a population decline to 0.30 to 0.35, and would very likely result in population growth.

The beluga whales in eastern Hudson Bay are currently considered to be 'endangered' by COSEWIC. The objective is to limit the harvesting of EHB animals to allow them to recover. The impact of harvesting on the EHB beluga whale population will be affected by the interaction between the actual number of animals killed in the EHB arc area versus animals reported taken during spring/summer and fall in Hudson Strait.

OTHER CONSIDERATIONS

Beluga in northern Quebec have been managed under a multi- year management plan. The efforts put in place over the last decade have succeeded in reducing overall harvest levels and at current reported harvest levels, the population may have stabilized under the current management plan.

However, with the new land claim agreement, management of this stock will pass to the new Nunavik Marine Resources Wildlife Board beginning with the 2010 harvest season. Developing a Precautionary Framework and setting future objectives need to be considered.

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